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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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ENVIRONMENTAL STATEMENT

FOR

EARTH RESOURCES AIRCRAFT PROGRAM

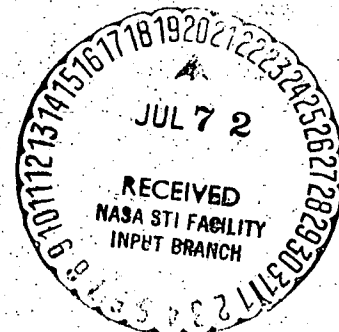
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ENVIRONMENTAL IMPACT STATEMENT

EARTH OBSERVATIONS AIRCRAFT PROGRAM

BACKGROUND

Since the early 1960's the Federal Government has been engaged in research which will lead to instrumentation which will on a routine basis provide data for management of the ecology. The development of remote sensors for use in aircraft and spacecraft provides the base of this research program.

The remote sensors are the heart of a system which will gather various types of data, analyze the data, and as a result of comparison with known data points provide the basis for scientific management of the ecology. An example of the use of remote sensing technology to assist in the solution of real problems was the study of the southern corn leaf blight of 1970 using data acquired by multispectral scanners and cameras flown in aircraft. The objective of the flights was to evaluate the feasibility of detecting the blight in its various degrees in infection through the use of remote sensing. A computer analysis of the flight data allowed detection of five classes of severity of infection. These significant results demonstrate the effectiveness of remote sensing in identifying blight severity in time to take actions to minimize losses.

PROGRAM OBJECTIVES AND SUMMARY

The basic objective of this program is the acquisition and use of high altitude airborne platforms now aboard four aircraft to collect Earth

Observations data to perform science experiments and disseminate data to investigators. This necessarily includes the development and utilization of remote sensors as well as the conduct of prototype experiments to serve as data sources for many investigators. NASA is continuing to cooperate closely with the user government agencies: the Department of Agriculture, Department of Interior, Department of Commerce, and the Navy Department. State and local agencies and the scientific community are also included in this program through direct NASA support and through cooperative programs with user agencies.

PROBABLE TOTAL IMPACT OF THE PROGRAM IN THE ENVIRONMENT

The NASA Earth Resources Aircraft Program is an intensive research effort which is advancing remote sensing techniques and hardware with virtually no adverse impact on the environment. The operation of four aircraft out of the tens of thousands in the air today cannot create significant amount of environmental degradation. The immeasurable national benefits which will accrue in environmental control and improvement cannot be weighed against elimination of the program. This research is one of the primary programs in the national effort to protect our environment.

ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

The adverse effects which cannot be avoided amount to the operation of the aircraft (paragraph 3) which meet the established criteria for operational aircraft.

ALTERNATIVES TO THE PROPOSED ACTION

It might be possible to develop these sensors for use at ground stations and with an extensive ground support program begin to meet program objectives. The very expensive, extensive ground program required and lack of aircraft coverage over oceans make it an impractical approach to the problem.

RELATIONSHIP BETWEEN THE LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The relatively short-term usage of aircraft to continue the maintenance and enhance our environment is evident in the results to date.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF NATURAL RESOURCES WHICH ARE INVOLVED

None

SUMMARY

The Earth Resources Aircraft Program (ERAP) was initiated at Manned Spacecraft Center (MSC) in mid-1964 with the acquisition of a Convair 240A for use in conducting Earth surveys with remote sensors. There are currently four aircraft in the program three of which were acquired through loan arrangements with the Department of Defense and are based at Ellington Air Force Base. The fourth, a C-47 equipped with a multispectral IR scanner, is owned by the University of Michigan and operated under contract to NASA. The three aircraft based at Ellington are:

- (a) Lockheed P-3A; this aircraft is heavily instrumented with RADAR and multifrequency passive microwave sensors and is considered the prime aircraft for oceanographic surveys.

- (b) Lockheed C-130B; this aircraft replaced the CV-240. This aircraft provides large volume for instruments and performs at greater ranges and altitudes. A Bendix 24-channel multispectral scanner system is currently being installed in this aircraft.
- (c) An RB-57F; this aircraft provides coverage at altitudes in excess of 60,000 feet.

The three MSC based aircraft are equipped with instrument combinations which include photographic, infrared, radar, microwave and laser sensors. Data is gathered over approximately 250 test sites located within the United States in addition to several test sites used in cooperation with two Latin American countries. Data acquired are analyzed by cooperating university scientists or user agencies, and results are compared to known phenomena and conditions established at the test site through "ground truth" data.

Investigators cooperating in NASA's Earth Resources Survey program are using data provided by the aircraft in research aimed toward the practical application of remote sensing to the management of the ecology. Typical investigations include crop and forest surveys, land use patterns, natural disaster damage assessments (tornados, hurricanes, earthquakes), fish location, air and water pollution, air-sea interaction, mineral identification and sea state characteristics.

NASA also plans to use the aircraft as a test platform for development of remote sensors which will be flown in space and as a training platform for space station and space shuttle missions involving remote sensing activities. Emphasis in the program will shift in March 1972 with the launch of the first Earth Resources Technology satellite when aircraft will be used to provide 'underflights' over selected test sites to assist in the correlation and interpretation of the satellite data with data obtained from surface observatories.